CCHCS Care Guide: Asthma

SUMMARY | **DECISION SUPPORT** | **PATIENT EDUCATION/SELF MANAGEMENT**

GOALS

- ✓ **Classify patients by asthma severity**
- ✓ **Enter specific asthma diagnosis on Problem List**
- ✓ **Manage treatment using NAEPP EPR3-STEPWISE APPROACH[1]**
- ✓ **Engage patients in their care with use of Asthma Action Plan and Asthma Control Test (ACT) as indicated**
- ✓ **Prevent exacerbations and minimize adverse effects of therapy**

ALERTS

- **Poor control:↑ symptoms, ↑ SABA use, ↓ PEF*, etc.**
- **SaO_2 < 92 %**
- **Can't speak more than one to two words per breath**
- **PEF < 50% predicted or personal best**
- **Silent chest, cyanosis, confusion**

DIAGNOSTIC CRITERIA/EVALUATION

Asthma is a chronic disease that causes narrowing of the airways from inflammation leading to airway obstruction (bronchospasm) and airway hyper-responsiveness. **Classifying** the **severity** of a patient's asthma is the first requirement in **determining the appropriate treatment**.

SEVERITY CLASSIFICATION	INTERMITTENT	PERSISTENT		
		MILD	MODERATE	SEVERE
SYMPTOM FREQUENCY	≤ 2 days/week	> 2 days/week but not daily	Daily	Throughout day
NIGHTTIME AWAKENINGS	≤ 2 times/month	3-4 times/month	> 1 day/week but not nightly	Often 7 days/week
SABA* USE FOR SYMPTOM CONTROL (NOT PREVENTION OF EIB+)	≤ 2 days/week	> 2 days/week but not > 1 time/day	Daily	Several times per day
INTERFERENCE WITH NORMAL ACTIVITY	None	Minor limitation	Some limitation	Extremely limited
SPIROMETRY LUNG FUNCTION	Normal FEV_1 between exacerbations FEV_1* > 80% predicted FEV_1 / FVC* normal	$FEV_1 \geq 80\%$ predicted FEV_1 / FVC normal	FEV_1 > 60% predicted but < 80% predicted FEV_1 / FVC reduced ≤ 5%	FEV_1 < 60% predicted FEV_1 / FVC reduced > 5%

+Exercise-Induced Bronchoconstriction (EIB): formerly known as exercise-induced asthma, symptoms occur 5-15 minutes after start of exercise, and can continue for 10-15 minutes after stop of exercise. The symptoms interfere with performance and EIB usually resolve with 30–60 minutes of rest. EIB may flare when the air is cold. (See page 5)

History/Examination including (See page 5):

- Medications, smoking history, hospitalizations/intubations due to asthma; known triggers; seasonal variability; vaccination history
- Spirometry if diagnosis in question (Pre and post bronchodilator– should see ≥ 12% [and 200 ml] increase in FEV_1)
- Exam including heart and lung, complete vitals (BP, P, RR, SaO_2, T, Ht/Wt). Obtain baseline peak flow (See Attachment A for Peak Flow Predicted Values) and follow-up if signs or symptoms of increased severity of asthma are noted; and as needed
- Differential diagnosis: other pulmonary diseases, cardiac disease, infectious disease, airway obstruction, etc.
- Enter Diagnosis on Problem List (i.e., intermittent asthma, mild persistent asthma, moderate persistent asthma, etc.)

TREATMENT OPTIONS

- A basic principle of asthma therapy is that the intensity of treatment should match the severity of asthmatic symptoms
- Asthma control focuses on **reducing impairment** (frequency & intensity of symptoms and functional limitations); and **reducing risk** (the likelihood of future asthma attacks, progressive decline in lung function, or medication side effects)
- National Asthma Education and Prevention Program, Third Expert Panel (NAEPP EPR3)[1] recommends **first classifying asthma severity,** then **initiating therapy using the STEPWISE treatment approach** (See page 8)
- Step up therapy if not well controlled. Review adherence to medications, inhaler technique, and comorbid conditions
- Step down therapy if well controlled > 3 months on current therapy
- **Patient education**: help patients identify their triggers and how to avoid them, smoking cessation, proper inhaler use (if indicated), Asthma Action Plan (See Patient Education PE-4) and Asthma Control Test form (See CDCR 7230, ACT Form)
- **Intermittent Asthma:** STEP 1 = SABA as needed
- **Persistent Asthma:** Daily medication (Consider pulmonary consult if > Step 3 care is required) (See detailed steps on page 8)

***Definition of Terms:** SABA - Short Acting Beta Agonist; LABA - Long Acting Beta Agonist; ICS - Inhaled Corticosteroids; EIB - Exercise Induced Bronchoconstriction; PEF - Peak Expiratory Flow; FEV_1 - Forced Expiratory Volume in One Second; FVC - Forced Vital Capacity

MONITORING (SEE ALGORITHMS ON PAGES 2 & 3 AND PAGE 9)

Follow-up visits: as clinically indicated, but at least every 365 days

- Assess asthma control and adjust therapy. (See table on page 9)
- Review medication technique and adherence; assess side effects; review environmental control
- Consider Asthma Control Test at asthma-related visits
- Generally, PEFs should be done at every asthma-related visit to document control
- Review Asthma Action Plan with patient, revise as needed
- If recent exacerbation, follow closely until patient is clinically improved, and at their baseline

TABLE OF CONTENTS

ASTHMA: ASSESSMENT AND TREATMENT[1-6]

ASSESSMENT (SEE PAGE 5):
- History and physical, including PEF
- Confirm new diagnosis with spirometry
- Patient education including nursing verification of correct inhaler technique
- Identify triggers-Seasonal? URI? Allergens?
- Use ACT form (See CDCR 7230, ACT Form). Can be completed by patient, nurse, or PCP to assess asthma control
- Reports of Exercise Induced Bronchoconstriction (EIB) alone, without objective evidence of EIB, is not an indication for continued use of SABAs or ICS

ICS Dosing:
Mometasone
(Formulary agent- Asmanex HFA®):
Strengths; 100 or 200 mcg/puff
"Low" Dose: 100 mcg twice daily
"Med" Dose: 200 mcg twice daily
"High" Dose: 400 mcg twice daily

-Consider tapering to lower dose when patient stable

ASSIGN SEVERITY CLASSIFICATION to each patient **(SEE PAGES 6-7)**
(This is done at diagnosis **BEFORE starting medications**)
Document specific classification on Problem List

INTERMITTENT
- Symptoms ≤ 2 times/wk
- Nighttime symptoms ≤ 2 times/month
- Asymptomatic and normal PEF between exacerbations
- Normal Activity Interference= None
- FEV_1 or PEF > 80% predicted (% personal best)
- SABA use ≤ 2 times/week

MILD PERSISTENT
- Symptoms > 2 times/wk but not daily
- Nighttime symptoms three to four times per month
- Normal Activity Interference= Minor
- FEV_1 or PEF > 80% predicted (% personal best)
- SABA use > 2 days/wk but not > 1x/day

MODERATE PERSISTENT
- Daily symptoms
- Nighttime symptoms > 1x/wk
- Normal Activity Interference = Some
- Exacerbations may last many days
- FEV_1 or PEF >60% But < 80% predicted (% personal best)
- SABA use = daily

SEVERE PERSISTENT
- Continual symptoms
- History of intubation or ICU admission
- ≥ 2 hospitalizations in past year for asthma
- Normal Activity Interference = Extreme
- Frequent exacerbations
- Frequent nighttime symptoms
- FEV_1 or PEF < 60% predicted (% personal best)
- SABA use = several times/day

INITIAL TREATMENT RECOMMENDATIONS BASED ON SEVERITY (SEE PAGE 8)

INTERMITTENT TREATMENT
- Generally no ICS, unless seasonal use needed
- "Rescue" SABA two puffs up to four times daily as needed

MILD PERSISTENT TREATMENT
- Low dose continuous ICS or consider intermittent use of ICS for flares
- "Rescue" SABA two puffs, four times daily as needed

MODERATE PERSISTENT TREATMENT
- Medium dose ICS
- "Rescue" SABA two puffs four times daily as needed

SEVERE PERSISTENT TREATMENT
- High dose ICS
- "Rescue" SABA two puffs four times daily PRN
- Consider short-term addition of LABA (salmeterol one puff twice daily), or combination ICS + LABA (Dulera®)

*Note Black Box warning

Controlled?

NO → Re-evaluate classification. Start ICS under Mild Persistent Treatment. Follow-up closely with Primary Care Team until stable

YES → Follow-up as clinically indicated (at least annually) with interval history, clinical assessment, and PEF when indicated

Controlled?

YES → Follow-up as clinically indicated (at least annually) with interval history, clinical assessment, and PEF when indicated

NO → Re-evaluate classification. Step up ICS to Moderate Persistent Treatment. Follow-up closely with Primary Care Team until stable

Controlled?

NO → Re-evaluate classification. Step up ICS to Severe Persistent Treatment. Follow-up closely with Primary Care Team until stable

YES → Follow-up as clinically indicated (at least annually) with interval history, clinical assessment, and PEF when indicated

Controlled?

YES → Consider course of oral steroids. Consider referral to pulmonology. Follow-up very closely with PCP until at baseline, then as indicated

NO → Spirometry if diagnosis in question

ABBREVIATIONS:
ICS: Inhaled Corticosteroid, **PEF:** Peak Expiratory Flow. **FEV_1:** Forced Expiratory Volume in one second;
EIB: Exercise Induced Bronchoconstriction

Adapted for correctional setting: National Asthma Education and Prevention Program Expert Panel Report 3:Guidelines for the Diagnosis and Management of Asthma

ACUTE EXACERBATIONS OF ASTHMA[1, 7, 9]

Initial Assessment
- Brief history – severity of symptoms, current medications, response to self treatment, time of onset, trigger, and risk factors
- Physical Exam – PEF, heart and respiratory rate, O_2 saturation and breath sounds

Evaluate exacerbation severity

Severe or life threatening? — YES

Signs/Symptoms of Severe Exacerbation
- Unable to perform PEF or PEF < 50% best or predicted
- Breathlessness (sits upright)
- Talks in words only, unable to talk in sentences/phrases
- Usually agitated
- Accessory muscles in use
- Wheezing (usually loud; inhalation & exhalation)
- SaO_2 < 92% (on room air at sea level)
- Respiratory rate (often > 25/min)
- Pulse > 110 bpm

Signs/Symptoms of Life Threatening Exacerbation
- Any S/S of severe asthma **AND/OR**
- Too dyspneic to speak; perspiring
- Silent chest, cyanosis, weak respiratory effort
- Bradycardia, dysrhythmia or hypotension
- Drowsiness, exhaustion, confusion

Arrange Emergency Transport to Nearest Hospital (Call 911)
- Oxygen to achieve $SaO_2 \geq 92\%$
- IV Access
- Prednisone 60 mg orally stat
- Inhaled high dose SABA + ipratropium with spacer every 20 minutes or continuously via oxygen driven nebulizer

PCP should see patient after hospital discharge**. Obtain peak flows and follow closely until back to baseline peak flow and stable

NO

Signs/Symptoms of Mild to Moderate Exacerbation
- Mild: PEF ≥ 80% best or predicted
- Moderate: PEF 50-79% best or predicted
- Talks in phrases; prefers sitting, not agitated
- Respiration < 25 breaths / minute
- Pulse < 110 beats/minute

Treatment:
- SABA 2-6 puffs with or without spacer* or 2.5 mg by nebulizer every 20 minutes up to 3 doses
- Oxygen to achieve $SaO_2 \geq 92\%$
- Consider oral steroid (Prednisone 40-60 mg daily 5-7 days)
- Reassess response every 20 minutes for first hour

Response to above therapy? — NO

Signs/Symptoms of Moderate Exacerbation
- PEF 50-79% best or predicted
- Continue SABA 2-6 puffs with or without spacer* or 2.5 mg by nebulizer every 20 minutes
- Oxygen to achieve $SaO_2 \geq 92\%$
- Oral systemic corticosteroid: Prednisone 40-60 mg po qd for 5-7 days

YES

Once PEF ≥ 80% and sustained response for 2-4 hours after last treatment

Evaluate if patient stable for return to housing, if so:
- Continue SABA 2-4 puffs every 4 hours for 1-2 days, then as needed
- Consider oral steroid course (see above)
- Consider adding or increasing dose of ICS
- Consider reclassifying severity

- Ensure patient has "rescue" SABA Inhaler
- Consider spacer
- Close follow up with Primary Care Team member until peak flow back to baseline and patient stable on usual medication**

Does patient have sustained improvement (PEF > 80%) allowing return to general population housing? — NO

Transfer to higher level of care if not improving or improvement not sustained

YES

- Continue SABA every 4-6 hrs as needed
- Continue oral Prednisone 40 to 60 mg po daily for 5-7 days
- Consider adding or increasing dose of ICS
- Consider reclassifying severity
- Close follow up with Primary Care Team member until peak flow back to baseline and patient stable on usual medication**

NOTES:
- Dosage for oral steroids: Prednisone 40-60 mg orally every day for 5-7 days. No need to taper steroids if ≤ 10 days.

*If patient has difficulty using MDI, consider using spacer.

**Patients returning from HLOC/TTA should be seen as per existing CCHCS follow-up standards.

ABBREVIATIONS:

ICS: Inhaled Corticosteroid
PEF: Peak Expiratory Flow
MDI: Metered Dose Inhaler

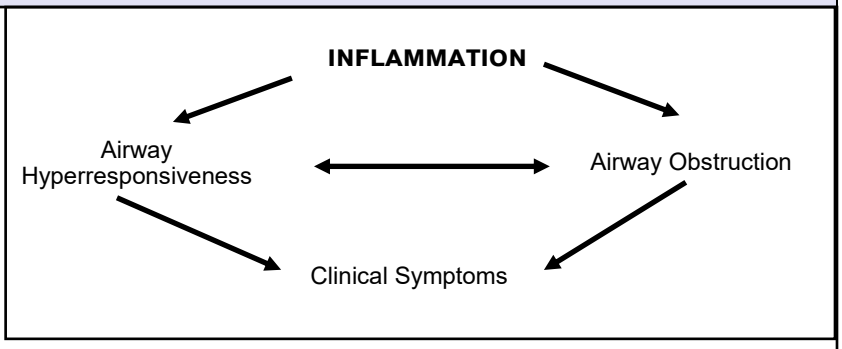
References: Adapted for correctional setting: National Asthma Education and Prevention Program Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma.
-UpToDate: Management of acute exacerbations of asthma in adults.
-GINA: 2018 Pocket Guide for Asthma Management and Prevention.

CCHCS Care Guide: Asthma

OVERVIEW OF ASTHMA[1, 3]

Asthma is a chronic disease that causes narrowing of the airways. The narrowed airways are caused by inflammation leading to airway obstruction (bronchospasm) and airway hyper responsiveness from triggers (i.e., inhaled allergens, irritants, etc.).

- Common clinical symptoms seen in patients with asthma include:
  - Wheezing,
  - Coughing,
  - Chest tightness, and
  - Shortness of breath



The interactions of these features determine the severity of asthma present and how patients will respond to treatment.

The National Asthma Education and Prevention Program (NAEPP) Expert Panel Report 3 (EPR3) Guidelines classify asthma by severity as:

- **Intermittent:** symptoms ≤ 2 days/week
- **Persistent Mild:** symptoms > 2 days/week but not daily
- **Persistent Moderate:** symptoms daily
- **Persistent Severe:** symptoms multiple times per day

The Healthcare Effectiveness Data and Information Set (HEDIS), and other quality of care measures are based on asthma severity, so it is crucial to put a specific diagnosis on the patients' Problem List. ICD10 does have the categories above which can be selected.

EVALUATION, TREATMENT, AND MONITORING OVERVIEW

The goal of asthma management is asthma control based on:

1. Reducing impairment – decreasing symptom frequency and intensity; and addressing how asthma affects the patients' daily life
2. Reducing risk – decreasing the number of future asthma attacks, lung function decline, and medication side effects

FIRST: Classify ASTHMA SEVERITY in Patients NOT Taking Medications

- Assess the patient and classify as **intermittent** OR **persistent** asthma (Classification of Asthma Severity on page 6-7)
- If the patient has **persistent** asthma, is it **mild, moderate, or severe**?

SECOND: Enter ICD10 Diagnosis in Medical Record first on Visit Diagnosis section and "convert" to **Problem List**
(Be specific: i.e., Intermittent, Mild persistent, Moderate persistent, Severe persistent asthma, etc.)

THIRD: TREATMENT based on the **STEPWISE APPROACH FOR MANAGING ASTHMA** (See page 8 & algorithm on page 2)

- Generally start treatment based on asthma severity classification and follow closely until the patient is stable/at baseline
- If control is not good, "Step up" treatment, and as the patient improves can "Step down" treatment, especially if triggers have been resolved

FOURTH: MONITORING: ASSESSING ASTHMA CONTROL & ADJUSTING THERAPY– Follow-up visits (See page 9)

- **ACT** - includes questions that cover asthma symptoms, interference with normal activity, shortness of breath frequency, rescue inhaler or nebulizer use, and asthma control self-rating scale, replaces the prior Asthma Control Assessment Tool (ACAT). Helpful to use at asthma related visits, especially if the patient's asthma is not at baseline. (See CDCR 7230 ACT Form)
- Perform Clinical Assessment and obtain PEF with hand-held device (if available) at baseline and then utilize when the patient presents with symptoms to follow treatment response and identify high risk flare
- Determine if **ASTHMA** is **Well Controlled, Not Well Controlled, or Very Poorly Controlled—**adjust therapy as indicated
- Follow-up closely until at baseline, and then follow-up as clinically indicated, but at least annually.

DIFFERENTIAL DIAGNOSIS

Young-middle-aged adults with asthma-like symptoms may have:

- Recurrent bronchitis, bronchiolitis or bronchectasis
- Paradoxical vocal cords (AKA laryngeal dysfunction)
- Pulmonary embolism
- Gastroesophageal reflux disease (GERD)
- Panic disorder
- Sarcoidosis (higher incidence in African-Americans)
- Chronic Obstructive Pulmonary Disease (COPD)

Older patients (especially cigarette smokers) may have:

- COPD and Asthma-COPD Overlap Syndrome (See page 13)
- Left-ventricular heart failure
- Sarcoidosis (in addition to above, symptoms can include shortness of breath, loss of lung function, and permanent damage)
- Tumors involving central airways
- Recurrent oropharyngeal aspiration

ASTHMA ASSESSMENT[1, 8-9, 11]

History:

- Symptoms (can be variable and recurrent): Cough, wheezing, difficulty breathing, chest tightness, are symptoms worse at night?
- Common triggers—exercise, cold air/seasonal, exposure to inhaled allergens, viral infections
- Previous history—smoking, asthma as a child, prior asthma medications, hospitalizations/intubations due to asthma, seasonal variability, vaccination history, work-related symptoms, family history of asthma and allergies, atopic symptoms such as atopic dermatitis or allergic rhinitis
- ACT replaces the previously used ACAT. The ACT is validated and includes questions that cover asthma symptoms, interference with normal activity, shortness of breath frequency, rescue inhaler or nebulizer use, and asthma control self-rating scale. It is easily scored and then used to help assess asthma control and make therapy adjustments during follow-up visits**.** Can be completed by the patient, nurse, or primary care physician to assess asthma control—baseline and subsequent visits (See CDCR 7230 ACT Form)

Physical Exam: is often normal

- Perform exam including heart and lung (most frequent finding is wheezing on auscultation, especially on forced expiration)
- Complete vitals (BP, P, RR, SaO_2, T, Height-for PEF calculation and weight [if needed for medication dosing])
- Obtain baseline peak flow when doing well (consider peak flow at every follow-up visit) (See Attachment A for Peak Flow Predicted Values)

PEF Monitoring:

- The PEF is the maximal rate that a person can exhale during a short maximal expiratory effort after a full inspiration
- The PEF percent predicted correlates pretty well with the percent predicted value for the forced expiratory volume in one second (FEV_1) and provides an objective measure of airflow obstruction
- PEF also tends to correlate with the symptoms assessed by the ACT; PEF readings may show a decline in asthma control before symptoms are noticed
- Handheld PEF devices should be available in every clinic; consider using at every asthma-related visit

Spirometry should be considered when: making the initial diagnosis of asthma; confirming reversible airflow limitations or excluding alternative diagnoses (Refer to Up To Date Online-Pulmonary Function Testing in Asthma)

Patient Education: Teach patients how to manage their asthma. (See Patient Education pages PE-1 to PE-4)

- Nursing verification of correct inhaler (and spacer if applicable) technique, proper use of hand-held PEF device
- Self-monitoring to assess level of asthma control and recognize signs of worsening asthma (either symptom or peak flow monitoring)
- Understanding what triggers their asthma and how they can avoid exposure to these triggers
- Asthma Action Plan (See PE-4): Teach the patient how to use the plan to proactively control asthma, adjust medications in response to worsening asthma symptoms, and seek medical care when appropriate. Encourage adherence to the plan and review/update as needed
- Asthma Control Test form (See CDCR 7230 ACT Form)

EXERCISE-INDUCED BRONCHOCONSTRICTION (EIB) ASSESSMENT[1, 12]

Some patients report bronchospasm/bronchoconstriction only while exercising. In the past this was called Exercise-Induced Asthma. More recently, the 2013 American Thoracic Society (ATS) practice guidelines call this condition **Exercise-Induced Bronchoconstriction (EIB)**.

EIB is thought to be related to the release of inflammatory mediators including histamine, tryptase and leukotrienes by airway eosinophils and mast cells; and triggered by aerobic exercise.

- **Diagnosis:** Usually based on history, chest tightness, pain, cough, wheezing or shortness of breath which typically occur 10–15 minutes after a brief episode of exercise or approximately 15 minutes into prolonged exercise. The symptoms interfere with performance and EIB usually resolves with 30–60 minutes of rest. EIB may flare when the air is cold. Additional work up may be indicated in equivocal cases. If symptoms persist or are not prevented by SABA use, formal pulmonary function tests may be required and or referral to specialist.
- **EIB ATS Guideline Treatment Recommendations:**
    - For patients with EIB, administer an inhaled SABA before exercise (*strong recommendation*, *high-quality evidence*). The SABA is typically administered 15 minutes before exercise.
    - For patients with EIB who continue to have symptoms despite using an inhaled SABA before exercise or who require an inhaled SABA daily or more frequently, ATS recommends adding other therapies including:
        - Daily administration of an ICS (*strong recommendation*, *moderate-quality evidence*)
            - It may take 2–4 weeks after the initiation of therapy to see maximal improvement
        - Daily leukotriene receptor antagonist is recommended (*strong recommendation*, *moderate-quality evidence*)
        - Mast cell stabilizing agent before exercise (*strong recommendation*, *high-quality evidence*)
        - Inhaled anticholinergic agent before exercise (*weak recommendation*, *low-quality evidence*)
- **Summary:** Use SABA 15 minutes before exercise initially. If SABA is used daily or more frequently, then add a daily inhaled ICS or a daily leukotriene receptor antagonist first (the choice between these agents is made on a case-by-case basis depending upon patient preferences and baseline lung function). Mast cell stabilizing agents and inhaled anticholinergic agents play a secondary role.

CLASSIFICATION OF ASTHMA SEVERITY[1, 8-9]

FIRST: Classify ASTHMA SEVERITY in Patients NOT Taking Medications

Asthma control focuses on two components:
1. **Reducing impairment**—decreasing **current symptom frequency and intensity** and addressing how asthma affects the patient's daily life.
2. **Reducing risk**—decreasing the number of future asthma exacerbations, lung function decline, and medication side effects; the risk of future exacerbations is based on the number of serious exacerbations in the past year.

These two components determine whether a patient's disease burden from asthma is under clinical control. Both these components are used in determining asthma severity and asthma control. The difference is:

- **Asthma SEVERITY** is an assessment of disease intensity before the start of therapy.
- **Asthma CONTROL** is an assessment of symptom frequency and lung function once treatment has been started.

Once you have determined your patient has asthma **determine the severity** of the asthma **before they are on medications** (the severity category helps guide which medications to start).

- **The degree of impairment is** based on: symptom frequency, number of nighttime awakenings, frequency of SABA use, degree of interference with normal activity, and lung function based on office spirometry.
- **The risk of future exacerbations is** based on the number of exacerbations over the past year.
- See chart below for details.

Classification of Asthma SEVERITY in Patients NOT Currently Taking Medications
(including recently diagnosed patients and those with a past asthma diagnosis not currently on medications)

COMPONENTS OF CONTROL	Severity Classification	Intermittent	Persistent		
			Mild	Moderate	Severe
IMPAIRMENT	**Symptom Frequency**	≤ 2 days/week	> 2 days/week but not daily	Daily	Throughout day
	Nighttime Awakenings	≤ 2 times/month	3-4 times/month	> 1 day/week but not nightly	Often 7 days/week
	Short-acting beta$_2$-agonist (SABA) use for symptom control (not prevention of EIB)	≤ 2 days/week	> 2 days/week but not > 1 time/day	Daily	Several times per day
	Interference with Normal Activity	None	Minor limitation	Some limitation	Extremely limited
	Spirometry Lung Function	Normal FEV_1 between exacerbations FEV_1 > 80% predicted FEV_1 / FVC normal	$FEV_1 \geq 80\%$ predicted FEV_1 / FVC normal	FEV_1 > 60% predicted but < 80% predicted FEV_1 / FVC reduced ≤ 5%	FEV_1 < 60% predicted FEV_1 / FVC reduced > 5%
RISK (Over last year)	**Exacerbations requiring systemic corticosteroids**	**Intermittent**	**Persistent**		
		≤ 1 time/year	≥ 2 times/year		

Note: Assign severity to the most severe category in which any feature occurs considering both impairment and risk

CLASSIFICATION OF ASTHMA SEVERITY (CONTINUED)

INTERMITTENT ASTHMA	• Daytime asthma symptoms occurring two or less days/week • Two or less nocturnal awakenings/month • SABA use to relieve symptoms no more than two days/week • No interference with normal activities between exacerbations • PEF or FEV_1 when asymptomatic that are consistently within normal limits (i.e., > 80% of predicted normal) • FEV_1 /FVC ratio is normal (based on age-adjusted values) when asymptomatic • Only one or no exacerbations requiring oral glucocorticoids in the preceding year
MILD PERSISTENT ASTHMA	• Symptoms more than two days/week (although less than daily) • Three to four nocturnal awakenings/month due to asthma • SABA use to relieve symptoms more than two days/week (but not daily) • Minor interference with normal activities • FEV_1 /FVC ratio is normal (based on age-adjusted values), but $FEV_1 \geq 80\%$ predicted • Two or more exacerbations requiring oral glucocorticoids per year
MODERATE PERSISTENT ASTHMA	• Daily symptoms of asthma • Nocturnal awakenings more than once/week (although not every night) • Daily need for SABA use to relieve symptoms • Some limitation in normal activity • FEV_1 between 60% and 80% predicted and a FEV_1/FVC ratio reduced 5% • Two or more exacerbations requiring oral glucocorticoids per year
SEVERE PERSISTENT ASTHMA	• Symptoms of asthma throughout the day • Nocturnal awakenings often 7 times/week • SABA use several times per day • Extremely limited in normal activity • $FEV_1 < 60\%$ predicted and a FEV_1 /FVC ratio > 5% • Two or more exacerbations requiring oral glucocorticoids per year

ACUTE EXACERBATIONS OF ASTHMA[1, 7]

- Asthma exacerbations are acute or subacute episodes of progressively worsening shortness of breath, cough, wheezing, and chest tightness—or some combination of these symptoms
- Exacerbations are characterized by decreases in expiratory airflow the severity of which can be objectively documented by simple measurement of lung function (PEF or spirometry)
- PEF measurements take < 1 minute to perform, but require careful instruction to obtain reliable measurements
- For management of asthma exacerbations, see the algorithm on page 3

SPECIAL POPULATIONS[1, 9]

- Occupational asthma and work-aggravated asthma: Ask whether asthma symptoms are improved when they are away from work or not; eliminate exposure ASAP
- Pregnant women: Obtain asthma history in all pregnant women and those who are planning to become pregnant; stress the importance of asthma controller treatment for the health of the mother and baby
- Elderly patients: Asthma may be under-diagnosed due to assumptions that dyspnea is normal in old age; they are not physically fit. Asthma may be over-diagnosed due to confusion with shortness of breath from left ventricular function or ischemic heart disease
- Smoker and ex-smokers: Asthma and COPD may co-exist or display asthma-COPD overlap in smokers

DOCUMENT DIAGNOSIS/SEVERITY ON PROBLEM LIST

SECOND: Enter ICD10 Diagnosis in Medical Record first on Visit Diagnosis section and "convert" to **Problem List**.

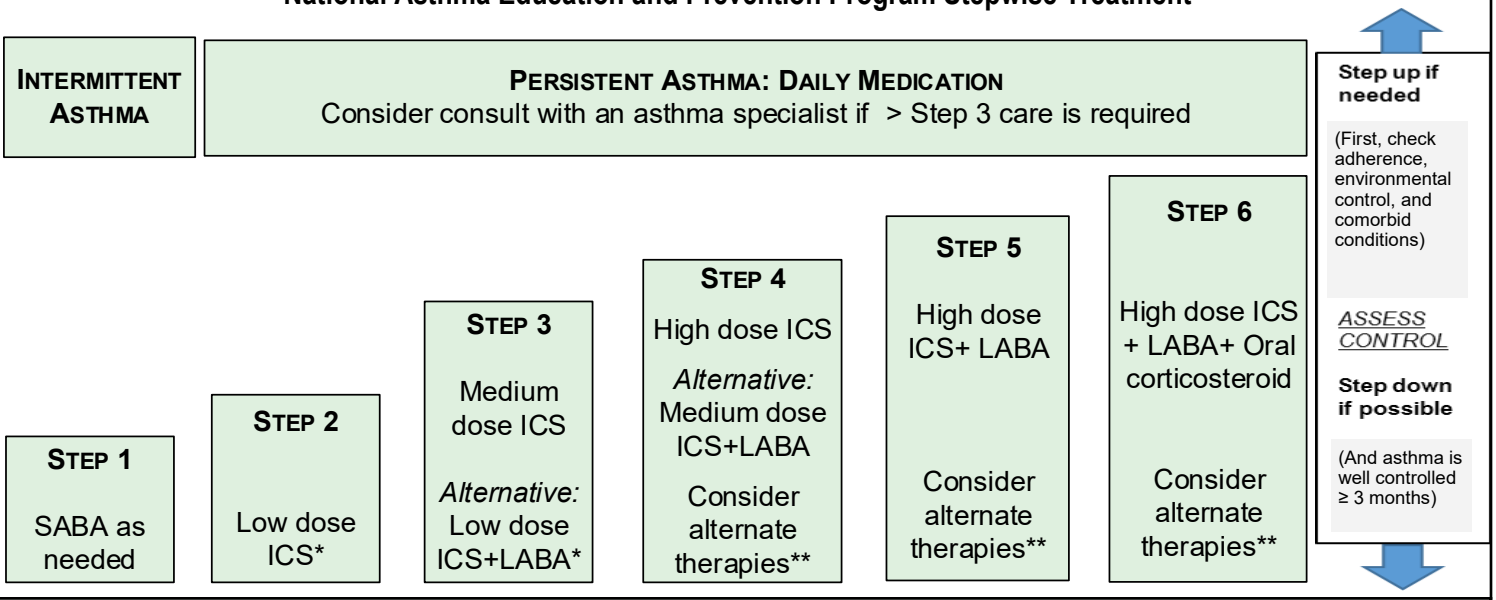
- Be specific: i.e., Intermittent, Mild persistent, Moderate persistent, Severe persistent asthma, etc. This affects the Quality Management Asthma Registry and the flagging of quality measures based on HEDIS

START TREATMENT: STEPWISE APPROACH FOR MANAGING ASTHMA[1, 9]

THIRD: Start Treatment: NAEPP EPR3 recommends classifying asthma severity then initiating therapy using the STEPWISE treatment approach. Generally speaking, the approximate relationship between the STEPs and the ASTHMA SEVERITY is as follows:

- **Step 1** ~ used for patients classified as **Intermittent** (SABA is used on an "as needed" basis)
- **Step 2** ~ used for patients classified as **Mild Persistent** (Regular low dose ICS plus as-needed SABA)
- **Step 3** ~ used for patients classified as **Moderate Persistent** (Consider pulmonary consult if > Step 3 is required)
- **Steps 4-6** are most likely patients classified as **Severe Persistent**

National Asthma Education and Prevention Program Stepwise Treatment



- QUICK RELIEF MEDICATIONS FOR ALL PATIENTS
  - SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms: up to 3 treatments at 20 minute intervals as needed may be needed in exacerbation.
  - Use of SABA > 2 days a weeks for symptom relief (*not for prevention of EIB) generally indicates inadequate control and the need to step up treatment.
- AT EACH STEP: PATIENT EDUCATION, ENVIRONMENTAL CONTROL, AND MANAGEMENT OF COMORBIDITIES

Adapted for correctional setting from NIH Guidelines: National Asthma Education and Prevention Program Expert Panel 3 2007

**Alternative therapies from NAEPP EPR3 suggest either Leukotriene Receptor Antagonist (LTRA) or Theophylline

Step up therapy if not well controlled.

- Before stepping up therapy- review adherence to medications, inhaler technique, and comorbid conditions
- Start ICS if symptoms associated with objective evidence of worsening disease (e.g., Triage and Treatment Area or Emergency Room visit with documented evidence of asthma, abnormal vital signs, decrease in peak flow with good effort, abnormal breath sounds):
  - > 2 days/week of symptoms/use SABA OR 3-4 nocturnal awakenings/month OR
  - Exacerbations requiring oral steroids

Step down therapy if well controlled > 3 months on current therapy.

General Treatment:

- Treat comorbidities: (e.g., chronic rhinosinusitis, GERD, obesity, obstructive sleep apnea, depression and anxiety, etc.)
- Consider intermittent use of ICS for flares with mild persistent asthma
- Use spacers
- Asthma exacerbation oral steroid burst, 40-60 mg Prednisone daily for five to seven days
- Ensure Smoking cessation

SPECIALTY REFERRAL GUIDELINES

GENERALLY REFER TO PULMONOLOGIST IF THE PATIENT HAS:

1. Asthma with complications or comorbidity (e.g., CO_2 retention, recent history of mechanical ventilation)
2. Continued asthma symptoms after maximal treatment, (e.g., multiple ER visits despite therapy)
3. Chronic corticosteroid use (e.g., on oral steroids > 4 weeks, or prolonged high-dose ICS used)

DETAILED CRITERIA CAN BE FOUND ON INTER-QUAL SMART SHEETS

MONITORING: ASSESSING ASTHMA CONTROL AND ADJUSTING THERAPY
(patients are currently taking medications)[1, 4-6]

Level of control is based on the most severe component of impairment (symptoms and functional limitations) or risk (exacerbations). Assess impairment by the patient's recall of events in Column 1 during the previous 2-4 weeks and by spirometry and/or peak flow measures, if applicable (See Attachment A for Peak Flow Predicted Values). Recommendations for adjusting therapy based on level of control are presented in the bottom row.

Classification of Asthma CONTROL in Patients CURRENTLY Taking Medications

Clinical Assessment	ASTHMA is:		
	Well controlled	**Not Well Controlled**	**Very Poorly Controlled**
ASTHMA CONTROL TEST (ACT) QUESTIONNAIRE – ADULT SCORE	**≥ 20**	**16 - 19**	**≤ 15**
SYMPTOM FREQUENCY	≤ 2 days/week	> 2 days/week	Throughout day
NIGHTTIME AWAKENINGS	≤ 2 times/month	1-3 times/week	≥ 4 times/week
SHORT-ACTING BETA$_2$-AGONIST (SABA) USE FOR SYMPTOM CONTROL (NOT PREVENTION OF EIB)	≤ 2 days/week	> 2 days/week	Several times per day
INTERFERENCE WITH NORMAL ACTIVITY	None	Some limitation	Extremely limited
SPIROMETRY LUNG FUNCTION FEV_1 (% predicted) or peak flow (% *personal best)*	> 80%	60 - 80%	< 60%
EXACERBATIONS REQUIRING SYSTEMIC CORTICOSTEROIDS	0-1 time/year	≥ 2 times/year	
RECOMMENDED ACTION FOR TREATMENT (See "Stepwise Approach for Managing Asthma Long Term" page 8) The stepwise approach is meant to help, not replace, the clinical decision making needed to meet individual patient needs	• Maintain current step • Regular follow-up interval (see algorithm on page 2) • Consider step down if well controlled for at least 3 months	Step up 1 step Reevaluate in 2-6 weeks to achieve control	• Consider short course of oral systemic corticosteroids • Step up 1-2 steps • Reevaluate in 2 weeks to achieve control
		Before step up in treatment: • Review adherence to medication, inhaler technique, and environmental control. • If alternative treatment was used, discontinue and use preferred treatment for that step. • For side effects, consider alternative treatment options.	

Adapted from NAEPP EPR3

FOLLOW-UP VISITS: as clinically indicated, but at least every 365 days
- Assess at each visit: asthma control, proper medication technique and adherence, written asthma action plan (if used), patient concerns
- Obtain pulmonary function measures by spirometry at least every 1-2 years; more frequently if asthma is not well controlled
- Determine if therapy should be adjusted, i.e., maintain treatment, step up (if needed), or step down, if possible
- Consider Asthma Control Test at asthma-related visits and PEF at every asthma-related visit to document control
- Review Asthma Action Plan with the patient, revise as needed
- If recent exacerbation, follow closely until the patient is clinically improved and at their baseline

SCHEDULE FOLLOW-UP CARE: Asthma is highly variable over time. Refer to algorithms (See pages 2 & 3)

MEDICATIONS

MEDICATION CLASS/ MEDICATION	DOSING	ADVERSE EFFECTS/ INTERACTIONS*	COMMENTS
Short-acting Beta Agonist (SABA)*			
Levalbuterol inhaled (Xopenex HFA®) 45 mcg/puff MDI with counter $$-$$$	Typical dose: 1-2 puffs orally every 4-6 hours Max Dose: 2 puff every 4 hours. Higher doses may be required acutely during severe exacerbations Hepatic Dosing: not defined Renal Dosing: not defined. Renal impairment: caution advised with high dose use 200 puffs/inhaler	Common Adverse Effects: vomiting, URI symptoms, headache, nervousness, tremor, tachycardia, palpitations, asthenia, dizziness, influenza-like symptoms, chest pain, hyperlactatemia	• Asthma rescue – NOT FOR DAILY USE. • Do not exceed the recommended doses of beta-agonists; fatalities have been reported in association with excessive use of inhaled sympathomimetic drugs in patients with asthma • Orders for SABA for asthma should include the indication. • Use with caution in patients with cardiovascular disorders including ischemic cardiac disease (coronary artery disease), hypertension, cardiac arrhythmias, tachycardia, or QT prolongation
Albuterol solution (nebulizer) 2.5 mg/3 ml $	Typical dose: 2.5 mg/nebulizer treatment up to 3 to 4 times per day Max dose: 4 doses/day or 10 mg/day. Higher doses may be required acutely during severe exacerbations Hepatic/Renal Dosing: see above	See above	See above
Long-acting Beta Agonist (LABA)[10] [Black box warning remains]**			
Salmeterol inhaled (Serevent Diskus®) 50 mcg/blister DPI **Diskus with counter $$$$$**	Typical dose: 50 mcg every 12 hours **Attempt taper once the patient is stable.** Do **NOT** use for acute asthma symptoms Hepatic Dosing: not defined. Hepatic impairment: caution advised Renal Dosing: not defined Do not use for acute asthma symptoms 60 doses/diskus	Common Adverse Effects: Headache, throat irritation, nasal congestion, rhinitis, tracheitis/ bronchitis, pharyngitis, urticaria, palpitations, tachycardia, tremor, nervousness	• **Black box warning:** LABAs increase risk of asthma-related death. Should only be used as adjuvant therapy in patients not adequately controlled on high dose inhaled corticosteroids or whose disease requires two maintenance therapies • Use higher doses of LABA with caution in patients with CAD, arrhythmias, or HTN. • Contraindicated in status asthmaticus • Do not use for acute asthma symptoms • Discard Diskus device 6 weeks after opening the foil pouch, when the counter reads "0", or after the expiration date on the package, whichever comes first
Inhaled Corticosteroid (ICS)			
Fluticasone inhaled (Flovent HFA®) 44, 110, 220 mcg/puff MDI with counter $$$$$	Typical dose: 2 puffs orally twice daily Low dose: 110 mcg twice daily Med dose: 220 mcg twice daily High dose: 440 mcg twice daily Hepatic Dosing: not defined. Hepatic impairment: monitor closely Renal Dosing: not defined 120 puffs/inhaler	Common Adverse Effects: URI symptoms, headache, throat irritation, candidiasis-oral, hoarseness, dysphonia, cough, nausea/vomiting, arthralgia/ myalgia, rash, pruritus, esophageal candidiasis	• Contraindicated in status asthmaticus • Do not use for acute asthma symptoms • Rinse mouth after use • Titrate to lowest effective dose once asthma controlled\
Beclomethasone inhaled (QVAR®) 40, 80 mcg/puff MDI with counter $$$$-$$$$$	Typical dose: 40-80 mcg twice daily Max 640 mcg/day Hepatic/Renal Dosing: not defined 120 puffs/inhaler	See above	• Contraindicated in status asthmaticus • Do not use for acute asthma symptoms • Rinse mouth after use • Titrate to lowest effective dose once asthma controlled • Careful observation for psychiatric decompensation is indicated in those with mental illness
Mometasone inhaled (Asmanex HFA®) 100, 200 mcg/puff MDI with counter $$$$	Typical dose: 2 puffs orally twice daily (AM and PM); starting dose based on previous asthma therapy Med dose: 200 mcg twice daily High dose: 400 mcg twice daily Titrate to lowest effective dose once asthma controlled Hepatic Dosing: not defined. Severe hepatic impairment: caution recommended Renal Dosing: not defined 120 puffs/inhaler	See above	• Contraindicated in status asthmaticus • Do not use for acute asthma symptoms • Rinse mouth after use • Titrate to lowest effective dose once asthma controlled

Bold = Formulary *See prescribing information for complete description of contraindications/precautions, adverse effects and drug interactions.

The cost scale $-$$$$$ represents the relative cost of acquisition of medication only. Frequency and complexity of medication administration (institution workload, effect on adherence) should be considered when determining overall cost-effectiveness of treatment.

**12-20-2017 FDA Drug Safety Communication: FDA review finds no significant increase in risk of serious asthma outcomes with long-acting beta agonists (LABAs) used in combination with inhaled corticosteroids (ICS). "Using LABAs alone to treat asthma without an ICS to treat lung inflammation is associated with an increased risk of asthma-related death. Therefore, the Boxed Warning stating this will remain in the labels of all single-ingredient LABA medicines . . ." [10]

MEDICATIONS CONTINUED

MEDICATION CLASS/ MEDICATION	DOSING	ADVERSE EFFECTS/ INTERACTIONS*	COMMENTS
Corticosteroid Oral			
Prednisone tablets **5 mg, 10 mg, 20 mg** (to be used in burst fashion during exacerbation) **$**	Typical dose: 40-60 mg orally daily for 5-7 days No taper needed for short treatment interval [≤ 10 days] Hepatic Dosing: not defined Renal Dosing: no adjustment	Common Adverse Effects: GI upset, psychiatric disturbances, bruising, immunosuppression, hypertension, fluid retention	• Contraindicated in systemic fungal infections; avoid administration of live or live attenuated vaccines with immunosuppressive doses of Prednisone • Careful observation for psychiatric decompensation is indicated in those with mental illness
Combination Inhaler Medications[10] **[Black box warning removed from combo ICS and LABA]**			
ICS + LABA **Mometasone + formoterol (Dulera®)** HFA-MDI Low to moderate dose: **100 mg/5 mcg** High dose: **200 mg/5 mcg** **MDI with counter** **$$$$$**	Typical dose: 2 puffs orally twice daily Hepatic Dosing: not defined Hepatic impairment: use caution Renal Dosing: not defined Do not use for acute asthma symptoms **120 puffs/inhaler**	Common Adverse Effects: Nasopharyngitis, headache, sinusitis, candidiasis-oral, dysphonia Use higher doses of LABA with caution in patients with CAD, arrhythmias, or hypertension	• Do not use for acute asthma symptoms • Attempt taper of LABA when the patient is stable for three months; consider dose reduction of ICS to lowest effective dose after LABA discontinued • Rinse mouth after use
ICS + LABA Fluticasone + salmeterol (Advair Diskus®) [100/50, 250/50, 500/50] Diskus with counter $$$$$	Typical dose: 1 puff twice daily Hepatic Dosing: not defined Renal Dosing: not defined Do not use for acute asthma symptoms 60 doses per device	ICS: see above. LABA: see above. Use higher doses of LABA with caution in patients with CAD, arrhythmias, or hypertension	• See above • Discard Diskus device 30 days after opening the foil pouch, when the counter reads "0", or after the expiration date on the package, whichever comes first
Leukotriene Inhibitors			
Montelukast (Singulair®) **10 mg tablet** **$**	Typical dose: 10 mg orally each evening Hepatic Dosing: mild-moderate impairment: no adjustment; severe impairment: not defined Renal Dosing: no adjustment Do not use for acute asthma symptoms	Common Adverse Effects: Headache, URI symptoms, fever, influenza-like symptoms, abdominal pain, cough, diarrhea, otitis media, otitis, nausea, dyspepsia, rash/ urticarial, sleep disorders, anxiety/ irritability, restlessness, tremor	• Do not use for acute asthma symptoms or acute bronchospasm. However, montelukast may be continued during the treatment of an acute asthmatic event • Postmarketing reports of neuropsychiatric events (e.g., abnormal dreams, agitation, aggression, anxiety, attention deficit, depression, disorientation, hallucinations, hostility, insomnia, irritability, memory disturbances, restlessness, sleep disturbance, suicide ideation/behavior, and tremor) have been noted in adult patients. Advise patients to report changes in behavior and mood immediately; consider alternate therapy if patients develop neuropsychiatric symptoms

Bold = Formulary *See prescribing information for complete description of contraindications/precautions, adverse effects and drug interactions.

The cost scale $-$$$$$ represents the relative cost of acquisition of medication only. Frequency and complexity of medication administration (institution workload, effect on adherence) should be considered when determining overall cost-effectiveness of treatment.

**12-20-2017 FDA Drug Safety Communication: FDA review finds no significant increase in risk of serious asthma outcomes with long-acting beta agonists (LABAs) used in combination with inhaled corticosteroids (ICS). "Using LABAs alone to treat asthma without an ICS to treat lung inflammation is associated with an increased risk of asthma-related death. Therefore, the Boxed Warning stating this will remain in the labels of all single-ingredient LABA medicines . . ." [10]

MEDICATIONS CONTINUED

MEDICATION CLASS/ MEDICATION	DOSING	ADVERSE EFFECTS/ INTERACTIONS*	COMMENTS
Other Asthma Medications			
Theophylline 100, 200, 300, 400, 450, 600 mg ER (bronchodilator) $$$$$	Typical dose: 300-600 mg/day divided daily to twice daily Written order should contain, "asthma not controlled with inhaled corticosteroid" OR "patient adherence higher with oral regimen" Hepatic Dosing: Dose reduction and frequent monitoring of serum theophylline concentration required. Max dose: 400 mg/day Renal Dosing: no adjustment	Common Adverse Effects: nausea, vomiting, headache, insomnia, diarrhea, irritability, restlessness, tremor, transient diuresis Significant drug interactions occur with phenytoin and cimetidine	• Use with caution in patients with cardiovascular disease, especially tachyarrhythmias; hyperthyroidism; peptic ulcer disease; history of seizures: may exacerbate these conditions • Monitor for signs and symptoms of theophylline toxicity (e.g., persistent or repetitive vomiting, tremor, tachycardia, confusion, seizures) • Careful observation for psychiatric decompensation is indicated in those with mental illness
Ipratropium inhaled (Atrovent HFA®) 17mcg/ puff **$$$$$** **Ipratropium solution:** **500 mcg / 2.5 ml** **$**	Asthma exacerbation, mod-severe: 8 puffs every 20 minutes as needed for up to 3 hours (give with SABA) Hepatic Dosing: no adjustment Renal Dosing: no adjustment **200 puffs/inhaler** Nebulizer: 2.5 ml every 20 minutes for 3 doses for acute asthma in combination with SABA	Common Adverse Effects: Bronchitis, dyspnea, nausea, xerostomia, influenza-like symptoms, sinusitis, dizziness. Dyspepsia, UTI, back pain, urinary hesitancy/retention	• Used with SABA via oxygen driven nebulizer for acute asthma exacerbations • Anticholinergic effects may worsen BPH or narrow-angle glaucoma

Bold = Formulary *See prescribing information for complete description of contraindications/precautions, adverse effects and drug interactions.

The cost scale $-$$$$$ represents the relative cost of acquisition of medication only. Frequency and complexity of medication administration (institution workload, effect on adherence) should be considered when determining overall cost-effectiveness of treatment.

ASTHMA, COPD, AND ASTHMA–COPD OVERLAP SYNDROME (ACOS)

Trying to determine whether your patient has asthma, COPD, or Asthma-COPD Overlap Syndrome (ACOS) can be problematic. The following tables are adapted from the 2015 GOLD and GINA consensus statement on Asthma, COPD, and ACOS.

DEFINITIONS:

- Asthma is a chronic disease that causes narrowing of the airways from inflammation leading to airway obstruction and airway hyper-responsiveness.
- COPD is a common preventable and treatable disease, characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases.[13]
- ACOS is characterized by persistent airflow limitation with several features usually associated with asthma and several features usually associated with COPD. ACOS is therefore identified in clinical practice by features that it shares with both asthma and COPD.[14]

FACTORS THAT MAY HELP DIFFERENTIATE ASTHMA, COPD, AND ACOS (Adapted from 2015 GOLD/GINA ACOS)

FACTORS	ASTHMA	COPD	ACOS
Age of onset	Usually childhood onset but can commence at any time	Usually > 40 years of age	Usually ≥ 40 years, but may have had symptoms in childhood or early adulthood
Pattern of respiratory symptoms	Symptoms may vary over time (day to day, or over longer periods), often limiting activity. Often triggered by exercise, emotions including laughter, dust or exposure to allergens	Chronic usually continuous symptoms, particularly during exercise, with "better" and "worse" days	Respiratory symptoms including exertional dyspnea are persistent but variability may be prominent
Lung function	Current and/or historical variable airflow limitation, e.g., bronchodilator (BD) reversibility, airway hyper-responsiveness (AHR)	FEV_1 may be improved by therapy, but post-BD $FEV_1/FVC < 0.7$ persists	Airflow limitation not fully reversible, but often with current or historical variability
Lung function between symptoms	May be normal between symptoms	Persistent airflow limitation	Persistent airflow limitation
Past history or family history	Many patients have allergies and a personal history of asthma in childhood, and/or family history of asthma	History of exposure to noxious particles and gases (mainly tobacco smoking and biomass fuels)	Frequently a history of doctor-diagnosed asthma (current or previous), allergies and a family history asthma, and/or a history of noxious exposures
Time course	Often improves spontaneously or with treatment, but may result in fixed airflow limitation	Generally, slowly progressive over years despite treatment	Symptoms are partly but significantly reduced by treatment. Progression is usual and treatment needs are high
Chest X-ray	Usually normal	Severe hyperinflation and other changes of COPD	Similar to COPD
Exacerbations	Exacerbations occur, but the risk of exacerbations can be considerably reduced by treatment	Exacerbations can be reduced by treatment. If present, comorbidities contribute to impairment	Exacerbations may be more common than in COPD but are reduced by treatment. Comorbidities can contribute to impairment
Airway inflammation	Eosinophils and/or neutrophils	Neutrophils +/- eosinophils in sputum, lymphocytes in airways, may have systemic inflammation	Eosinophils and/or neutrophils in sputum

SPIROMETRY IN ASTHMA, COPD, AND ACOS (Adapted from 2015 GOLD/GINA ACOS)

SPIROMETRIC VARIABLE	ASTHMA	COPD	ACOS
Normal FEV_1/FVC pre- or post-bronchodilator (BD)	Compatible with diagnosis	Not compatible with diagnosis	Not compatible unless other evidence of chronic airflow limitation
Post-BD $FEV_1/FVC < 0.7$	Indicates airflow limitation but may improve spontaneously or on treatment	Required for diagnosis per GOLD (see reference)	Usually present
$FEV_1 \geq 80\%$ predicted	Compatible with diagnosis (good asthma control or interval between symptoms)	Compatible with GOLD classification of mild airflow limitation (categories A or B) if post-BD $FEV_1/FVC < 0.7$	Compatible with diagnosis of mild ACOS
$FEV_1 < 80\%$ predicted	Compatible with diagnosis. Risk factor for asthma exacerbations	An indicator of severity of airflow limitation and risk of future events (e.g., mortality and COPD exacerbations)	An indicator of severity of airflow limitation and risk of future events (e.g., mortality and exacerbations)
Post-BD increase in $FEV_1 \geq 12\%$ and 200 ml from baseline (reversible airflow limitation)	Usual at some time in course of asthma, but may not be present when well-controlled or on controllers	Common and more likely when FEV_1 is low	Common and more likely when FEV_1 is low
Post-BD increase in $FEV_1 > 12\%$ and 400 ml from baseline (marked reversibility)	High probability of asthma	Unusual in COPD. Consider ACOS	Compatible with diagnosis of ACOS

COPD Additional Information: https://www.bing.com/search?q=gold+copd&src=IE-SearchBox&FORM=IESR4S
ACOS Additional Information: https://goldcopd.org/asthma-copd-asthma-copd-overlap-syndrome/

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Attachment A

Peak Flow Predicated Values for Men and Women

PEAK FLOW PREDICTED- MEN

Predicted average peak expiratory flow for normal males (L/min)

Age	Height				
	60"	65"	70"	75"	80"
20	554	602	649	693	740
25	543	590	636	679	725
30	532	577	622	664	710
35	521	565	609	651	695
40	509	552	596	636	680
45	498	540	583	622	665
50	486	527	569	607	649
55	475	515	556	593	634
60	463	502	542	578	618
65	452	490	529	564	603
70	440	477	515	550	587

These values represent average normal values within 100 L/min. Predicted values for African American and Hispanic minorities are approximately 10 percent lower.
Redrawn from Leiner, GC, et al, Am Rev Respir Dis 1963; 88:644.

PEAK FLOW PREDICTED- WOMEN

Predicted average peak expiratory flow for normal females (L/min)

Age	Height				
	55"	60"	65"	70"	75"
20	390	423	460	496	529
25	385	418	454	490	523
30	380	413	448	483	516
35	375	408	442	476	509
40	370	402	436	470	502
45	365	397	430	464	495
50	360	391	424	457	488
55	355	386	418	451	482
60	350	380	412	445	475
65	345	375	406	439	468
70	340	369	400	432	461

These values represent average normal values within 80 L/min. Predicted values for African American and Hispanic minorities are approximately 10 percent lower.
Redrawn from Leiner, GC, et al, Am Rev Respir Dis 1963; 88:644.

PATIENT EDUCATION/SELF MANAGEMENT

WHAT IS ASTHMA?

Asthma is a disease that affects your airways. Airways are the tubes that carry air in and out of your lungs. There are different kinds of asthma:

- **Intermittent:** You may have symptoms that come and go and are very mild. You do not need a "controller" inhaler, but you may sometimes need to use a "rescue" inhaler.
- **Persistent:** You have worse symptoms that happen more often. You need a "controller" inhaler to keep from having symptoms.
- **Exercise Related:** You only have symptoms when you exercise. You may need to use your "rescue" inhaler before starting to exercise.

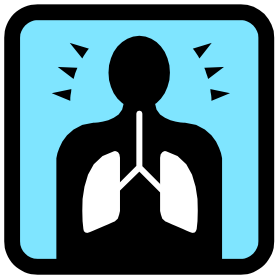
WHAT CAUSES ASTHMA?

- Can be common in your family
- Is more common in people with allergies
- Pollution can either cause asthma or make it worse
- Being exposed to certain diseases as a child adds to the chance of getting asthma

WHAT ARE THE SYMPTOMS OF ASTHMA?

When you have asthma you may:

- Wheeze – make a loud or soft whistling sound when you breathe
- Cough a lot
- Feel short of breath
- Have trouble sleeping because of coughing or having a hard time breathing
- Get tired quickly during exercise
- Have symptoms that are worse at night



HOW IS ASTHMA DIAGNOSED?

- Your health care provider will ask you about your medical history and examine you.
- Breathing tests may be needed to see how fast or deeply you breathe. Another test tells how much air is moving in and out of your lungs.

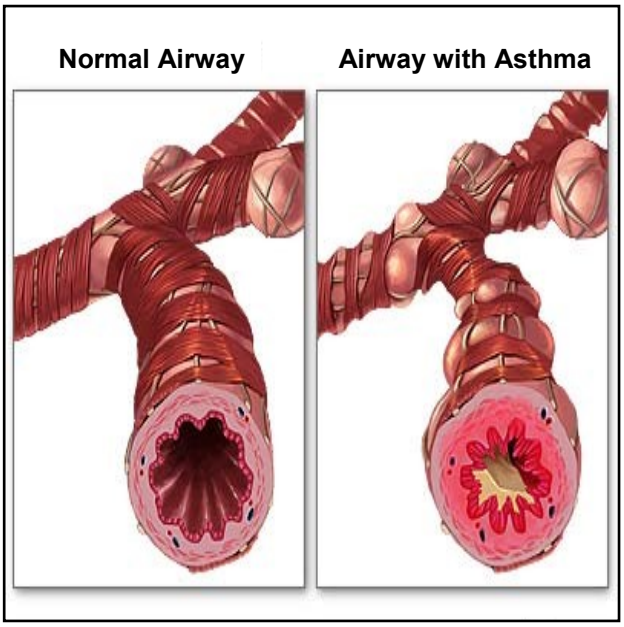
HOW IS ASTHMA TREATED?

"Rescue Inhaler"- XOPENEX® (Levalbuterol)

- Works because asthma causes the muscles around your airways to tighten & get smaller which makes breathing harder
- Tightening or narrowing of the airways can happen fast, but it can also get better fast using a "rescue" inhaler
- You should only need this type of inhaler once in a while. If you are using it daily, see your health care provider

"Controller Inhaler"– ASMANEX® OR DULERA®

- Asthma also causes long term swelling inside the airways
- This swelling narrows the airway and makes breathing harder
- The swelling is there most of the time, but a "controller" inhaler can help keep it down and keep your airways open
- Use your controller inhaler every day or as directed by your health care provider



PATIENT EDUCATION/SELF MANAGEMENT

HOW DO I AVOID ASTHMA ATTACKS?

- Don't Smoke.
- Be aware of things that can "trigger" or bring on an asthma attack and try to avoid them. Things like pollen, fumes, dust, or even strong emotions like anger, depression, or worry can bring on asthma.
- Try not to catch a cold or the flu. Wash your hands often and get a flu shot every year.
- Plan ahead and refill your prescription before it runs out.

WHAT DO I DO DURING AN ASTHMA ATTACK?

1. Use your "rescue" inhaler right away. XOPENEX® (Levalbuterol)
2. Sit down and loosen any tight fitting clothing. Do not lie down.
3. If you are not breathing better right away, take one puff of your "rescue" inhaler every minute for five minutes or until you are breathing better.
4. If you are not breathing better in five minutes, seek medical attention immediately.

TWO WAYS TO USE AN INHALER

Open Mouth: many doctors prefer this, but some patients find it harder

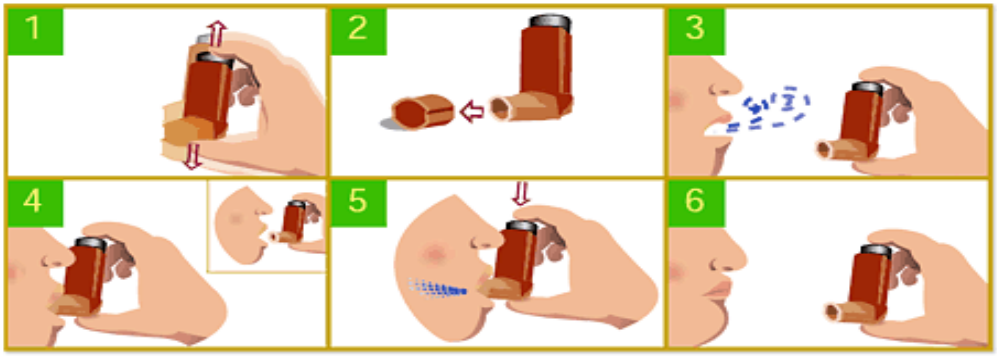
The only difference is you do not put the inhaler in your mouth (Step 4 below)

1. Shake the inhaler well before use (three or four shakes).
2. Remove the cap.
3. Breathe out, away from your inhaler
4. Hold the inhaler about **1-2 inches from your mouth**.
5. Start to breathe in slowly through your mouth, at the same time press the top of your inhaler to spray one puff and keep breathing in slowly until you've taken a full breath.
6. Hold your breath for about 10 seconds, then breathe out slowly.

If using controller (steroid) inhaler, rinse mouth after using and spit into a sink.

Closed Mouth: Follow these six steps (See pictures 1-6)

1. Shake the inhaler well before use (three or four shakes).
2. Remove the cap.
3. Breathe out, away from your inhaler.
4. Bring the inhaler to your mouth. Place it in your mouth between your teeth and **close your mouth** around it. (Do not let tongue block the inhaler opening).
5. Start to breathe in slowly. Press the top of your inhaler to release one puff and keep breathing in slowly until you've taken a full breath.
6. Remove the inhaler from your mouth, and hold your breath for about 10 seconds, then breathe out slowly. If using controller (steroid) inhaler, rinse mouth after using and spit into a sink.



Patient Education/Self Management

Hints: When you first use your inhaler/Cleaning your inhaler

The first time you use your inhaler (or if you have not used it in 7-10 days), point it away from you and press the top of the inhaler to "spray" 2-3 "puffs" to be sure the inhaler is working well.

To clean your <u>rescue</u> inhaler:

- Take the metal canister out of the plastic case
- Wash the plastic case twice a week with mild soap and water
- Rinse with running water
- Shake off excess water
- Air dry
- Put the plastic case and metal canister together when **completely dry**

To clean your daily <u>controller</u> (steroid) inhaler:

- Remove the cap. Keep the canister in the case.
- Wipe the opening where the metal canister meets the plastic case with a damp cloth.

Using a Spacer

A "spacer" is a tube that you use with your inhaler to help the medication get into your lungs better. Not everyone needs a spacer, but if you are having trouble using your inhaler, your nurse or Primary Care Provider may recommend you use a spacer.

How to use spacer:

1. Remove the cap from the inhaler and from the spacer device.
2. Insert the inhaler into the open end of the spacer (opposite the mouthpiece). Shake well.
3. Breathe out completely.
4. Place the mouthpiece of the spacer between your teeth and seal your lips tightly around it.
5. Press the inhaler one time (one puff).
6. Breathe in slowly and completely through your mouth. If you hear a horn-like sound, you are breathing too quickly and need to slow down.
7. <u>Hold your breath for at least 10 seconds</u> to allow the medication to get into your lungs.
8. If your dose is more than one puff then wait at least one minute before doing another puff.
9. When finished, remove the spacer from the inhaler, and put the caps back on the inhaler and spacer.
10. If you are using a controller (steroid) inhaler rinse your mouth with water and spit into a sink.

PATIENT EDUCATION/SELF MANAGEMENT

Asthma Action Plan

- An Asthma Action Plan is a tool used to help you track your asthma symptoms. It is also used to help give you direction on what to do when symptoms are not improving, and when you should see your health care provider. The correct use of this tool will help you control your asthma better, and prepare you to control it in the community.
- There are three zones (green, yellow, and red). The green zone is where you want to be on a daily basis.
- Follow the steps in your plan, and **immediately contact medical or custody if your symptoms do not improve.**
- Work with your health care team to have Peak Flow measured, and write down your values below.

Name:_____

Asthma Triggers:_____

Peak Flow Meter Personal Best:_____

Green Zone: My asthma is doing well.

Symptoms: *None. My breathing is good, no cough or wheeze, sleeps well at night*

Peak Flow Meter: _____ (more than 80% of personal best)

Control Medicine(s):	**Medicine**	**How much to take**	**When and how often**
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____

Physical Activity: ☐ Use albuterol/levalbuterol ____ puffs, 15 minutes before activity
☐ With all activity
☐ As needed

Yellow Zone: My asthma is getting worse.

Symptoms: *Some problems breathing, cough, wheeze, or tight chest, waking at night due to asthma*

Peak Flow Meter: _____ to _____ (between 50% and 79% of personal best)

Quick-relief Medicine(s): ☐ albuterol/levalbuterol ____ puffs, every 4 hours as needed

Control Medicine(s): ☐ Continue Green Zone medicines
☐ Add _____ ☐ Change to_____

If you do not feel back to normal after ONE hour with the above treatment: Contact Medical

Red Zone: Get Help Now!

Symptoms: *Lots of problems breathing, getting worse instead of better, medicine is not helping*

Peak Flow Meter: _____ (less than 50% of personal best)

Take Quick-relief Medicine(s) NOW: ☐ albuterol/levalbuterol ____ puffs, every _____

CONTACT MEDICAL/CUSTODY TO BE SEEN IMMEDIATELY!

EDUCACIÓN PARA EL PACIENTE/CONTROL PERSONAL DEL CASO

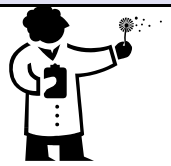
¿QUÉ ES EL ASMA?

El asma es una enfermedad que afecta sus vías respiratorias. Las vías respiratorias son los conductos que llevan el aire dentro y fuera de sus pulmones.
Hay diferentes tipos de asma:

- **Intermitente:** puede tener síntomas que aparecen y desaparecen, y sean muy leves. No necesita un inhalador "de control," pero es posible que a veces necesite usar un inhalador "de rescate."
- **Persistente:** presenta síntomas peores con mayor regularidad. Necesita un inhalador "de control" para prevenir los síntomas.
- **Relacionada con el ejercicio:** solo presenta síntomas cuando se ejercita. Es posible que necesite usar un inhalador "de rescate" antes de comenzar a ejercitarse.

¿QUÉ CAUSA EL ASMA?

- Puede ser común en su familia.
- Es más común en personas con alergias.
- La contaminación puede causar asma o empeorarla.
- Estar expuesto a ciertas enfermedades siendo un niño aumenta la probabilidad de padecer asma.



¿CUÁLES SON LOS SÍNTOMAS DEL ASMA?

Cuando tiene asma es posible que:

- Haga un sonido de silbato cuando respire.
- Tosa mucho.
- Le falte el aire.
- Tenga problemas para dormir debido a la tos o a la dificultad para respirar.
- Se canse rápidamente al ejercitarse.
- Presente síntomas que empeoren en la noche.

¿CÓMO SE DIAGNOSTICA EL ASMA?

- Su proveedor de atención médica le preguntará acerca de su historia clínica y lo examinará.
- Es posible que se necesiten pruebas de respiración para ver la velocidad o profundidad con las que respira. Otra prueba indica la cantidad de aire que entra y sale de sus pulmones.

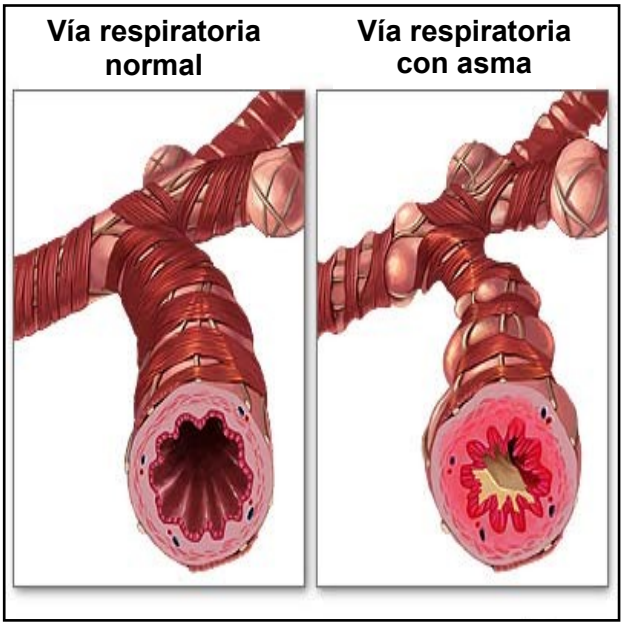
¿CÓMO SE TRATA EL ASMA?

"Inhalador de rescate"- XOPENEX® (levalbuterol)

- Funciona porque el asma provoca que los músculos alrededor de las vías respiratorias se tensen y se hagan más pequeños, lo que dificulta la respiración.
- Las vías respiratorias pueden tensarse o estrecharse muy rápido, pero también pueden aliviarse rápidamente al usar un inhalador "de rescate."
- Es posible que solo necesite este tipo de inhalador de vez en cuando. Si lo usa diario, consulte a su proveedor de atención médica.

"Inhalador de control"– ASMANEX® O DULERA®

- El asma también provoca inflamación a largo plazo dentro de las vías respiratorias.
- Esta inflamación estrecha las vías respiratorias y dificulta la respiración.
- La inflamación permanece la mayor parte del tiempo, pero un inhalador "de control" puede ayudar a que sea leve y mantener sus vías respiratorias abiertas.
- Use su inhalador de control todos los días o como lo indique su proveedor de atención médica.



EDUCACIÓN PARA EL PACIENTE/CONTROL PERSONAL DEL CASO

¿Cómo evito los ataques de asma?

- No fume.
- Sea consciente de aquello que puede "desencadenar," o provocar, un ataque de asma e intente evitarlo. Cosas como el polen, el humo, el polvo o incluso las emociones fuertes como el enojo, la depresión o la preocupación pueden provocar el asma.
- Procure no contagiarse de gripe o un resfriado. Lávese las manos con frecuencia y póngase una vacuna contra la gripe cada año.
- Planee y resurta sus medicamentos antes de que se acaben.

¿Qué debo hacer durante un ataque de asma?

1. Use su inhalador "de rescate" de inmediato. XOPENEX® (levalbuterol)
2. Siéntese y afloje cualquier ropa apretada. No se acueste.
3. Si no respira mejor de inmediato, tome un disparo de su inhalador "de rescate" cada minuto durante cinco minutos o hasta que respire mejor.
4. Si no respira mejor dentro de un plazo de cinco minutos, busque atención médica de inmediato.

DOS MANERAS DE USAR UN INHALADOR

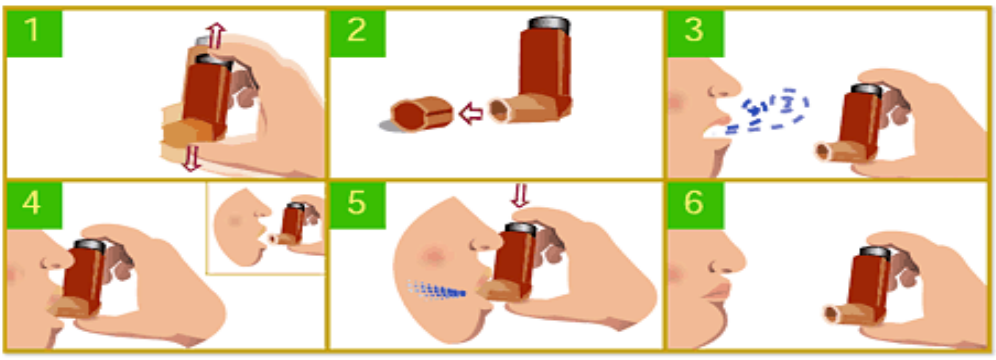
<u>Con la boca abierta:</u> muchos médicos prefieren esta manera, pero algunos pacientes creen que es más difícil.

La única diferencia es que <u>no</u> pone el inhalador en su boca (paso 4 a continuación).

1. Agite bien el inhalador antes de usarlo (tres o cuatro veces).
2. Quite la tapa.
3. Exhale hacia otro lugar que no sea el inhalador.
4. Coloque el inhalador a **<u>1 o 2 pulgadas de su boca</u>**.
5. Comience a inhalar lentamente por su boca y, al mismo tiempo, presione la parte superior de su inhalador para disparar una dosis y seguir inhalando lentamente hasta que haya hecho una respiración completa.
6. <u>Mantenga la respiración durante 10 segundos</u>, luego exhale despacio. Si usa un inhalador de control (esteroide), enjuague su boca luego de usarlo y escupa en un lavabo.

<u>Con la boca cerrada</u>: Siga estos seis pasos (vea las imágenes 1 a 6)

1. Agite bien el inhalador antes de usarlo (tres o cuatro veces).
2. Quite la tapa.
3. Exhale hacia otro lugar que no sea el inhalador.
4. Acerque el inhalador a su boca. Póngalo en su boca entre sus dientes y **<u>cierre la boca</u>** alrededor de él. (No permita que su lengua bloquee la entrada del inhalador).
5. Comience a inhalar lentamente. Presione la parte superior de su inhalador para disparar una dosis y continúe inhalando lentamente hasta que haya hecho una respiración completa.
6. Quite el inhalador de su boca y <u>mantenga la respiración durante 10 segundos</u>, luego exhale despacio. Si usa un inhalador de control (esteroide), enjuague su boca luego de usarlo y escupa en un lavabo.



EDUCACIÓN PARA EL PACIENTE/CONTROL PERSONAL DEL CASO

CONSEJOS: CUANDO USE O LIMPIE POR PRIMERA VEZ SU INHALADOR

La primera vez que use su inhalador (o si no lo ha usado en 7 a 10 días), apúntelo hacia otro lugar y presione la parte superior para "liberar" de 2 a 3 "disparos" para asegurarse de que funciona correctamente.

Para limpiar su inhalador <u>de rescate</u>:

- Saque el bote de metal del estuche de plástico.
- Lave el estuche de plástico dos veces a la semana con jabón neutro y agua.
- Enjuáguelo con agua de la llave.
- Sacúdalo para eliminar el exceso de agua.
- Déjelo secar.
- Arme el estuche de plástico y el bote de metal cuando se hayan secado por completo.

Para limpiar su inhalador <u>de control</u> (esteroide) diario:

- Quite la tapa. Deje el bote en el estuche.
- Limpie la entrada donde el bote de metal se junta con el estuche de plástico con un pañuelo húmedo.

CÓMO USAR UN ESPACIADOR

Un "espaciador" es un tubo que se usa con el inhalador para ayudar a que el medicamento entre mejor a sus pulmones. No todos necesitan un espaciador, pero si tiene problemas para usar su inhalador, su enfermera o proveedor de atención primaria pueden recomendarle que use un espaciador.

Cómo usar un espaciador:

1. Quite la tapa del inhalador y del dispositivo espaciador.
2. Inserte el inhalador en el extremo abierto del espaciador (del lado opuesto a la boquilla). Agítelo bien.
3. Exhale completamente.
4. Ponga la boquilla del espaciador entre sus dientes y cierre los labios alrededor de ella.
5. Presione el inhalador una vez (un disparo).
6. Inhale lentamente y por completo a través de la boca. Si escucha un sonido parecido a una trompeta, está respirando demasiado rápido y necesita hacerlo más lento.
7. <u>Mantenga la respiración durante, al menos, 10 segundos</u> para permitir que el medicamento entre a sus pulmones.
8. Si su dosis es más de un disparo, espere al menos un minuto antes de hacerlo de nuevo.
9. Cuando termine, quite el espaciador del inhalador y ponga de nuevo las tapas en el inhalador y el espaciador.
10. Si usa un inhalador de control (esteroide), enjuáguese la boca con agua y escupa en un lavabo.

EDUCACIÓN PARA EL PACIENTE/CONTROL PERSONAL DEL CASO

Plan de acción contra el asma

- Un plan de acción contra el asma es una herramienta usada para ayudar a identificar sus síntomas del asma. También se usa para ayudar a darle instrucciones sobre qué hacer cuando los síntomas no mejoran y cuándo debe consultar a su proveedor de atención médica. El uso correcto de esta herramienta le ayudará a controlar mejor su asma y prepararse para controlarla en la comunidad.
- Hay tres zonas (verde, amarilla y roja). La zona verde es donde quiere estar a diario.
- Siga estos pasos de su plan y **comuníquese de inmediato con su médico o custodio si sus síntomas no mejoran**.

Nombre:_____

Desencadenantes del asma:_____

Marca personal de la medida del flujo máximo:

Zona verde: mi asma está bien.

Síntomas: *ninguno. Mi respiración está bien, no hay tos ni silbidos, duermo bien por la noche.*

Medida del flujo máximo: _____(más del 80 % de la marca personal)

Medicamentos de control: **Medicamento**	**Dosis**	**Cuándo y con qué frecuencia**
_____	_____	_____
_____	_____	_____
_____	_____	_____

Actividad física: ☐ Use ____ disparos de albuterol/levalbuterol 15 minutos antes realizar alguna actividad.
☐ Con todas las actividades.
☐ Según sea necesario.

Zona amarilla: mi asma está empeorando.

Síntomas: *algunos problemas para respirar, tos, silbidos, presión en el pecho, despertar por la noche debido al asma.*

Medida del flujo máximo: de _____ a _____ (entre 50 % y 79 % de la marca personal)

Medicamentos de alivio rápido: ☐ ____ disparos de albuterol/levalbuterol, cada 4 horas según sea necesario.

Medicamentos de control: ☐ Siga tomando los medicamentos de la zona verde.
☐ Agregar _____ ☐ Cambiar a_____

Si no se siente como de costumbre después de UNA hora de realizar alguno de los tratamientos anteriores: comuníquese con su médico.

Zona roja: ¡obtenga ayuda ahora!

Síntomas: *muchos problemas para respirar, el asma empeora en lugar de mejorar, el medicamento no ayuda.*

Medida del flujo máximo: __ (menos del 50 % de la marca personal)

Tome medicamentos de alivio rápido AHORA: ____ disparos de albuterol/levalbuterol, cada ___.

¡COMUNÍQUESE CON SU MÉDICO O CUSTODIO PARA QUE LO ATIENDAN DE INMEDIATO!